

12/20/02
#11/ResponsePATENT
Docket No. 150.00800102IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant(s): Brian A. Vaartstra) Group Art Unit: 1756
Serial No.: 09/651,702) Examiner: N. Barreca
Confirmation No.: 2471)
Filed: August 30, 2000)
For: SUPERCritical COMPOSITIONS FOR REMOVAL OF ORGANIC MATERIAL
AND METHODS OF USING SAME

RESPONSE UNDER 37 CFR §1.116

Assistant Commissioner for Patents
BOX AF
Washington D.C. 20231

Dear Sir:

In response to the Office Action mailed September 18, 2002, please consider and enter the following remarks.

Remarks

The Office Action mailed September 18, 2002 has been received and reviewed. The pending claims are claims 19-25, 27-29, 31-32, and 43-48. Reconsideration and withdrawal of the rejections are respectfully requested in view of the accompanying remarks.

Objections to the Claims

The Examiner objected to the misnumbered claims 33-38 and indicated that they have been renumbered 43-48, which Applicant is interpreting as an Examiner's Amendment (e.g., M.P.E.P. §608.01(j)). Applicant respectfully request that the Examiner notify Applicant in the next Official Communication if any further action is required by Applicant to correct the claim numbering.

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For: **SUPERCRITICAL COMPOSITIONS FOR REMOVAL OF ORGANIC MATERIAL AND METHODS OF USING SAME****Drawings**

Applicant thanks the Examiner for approving the substitute drawing sheet submitted with the Amendment and Response on May 28, 2002. The Examiner indicated that corrected drawings are required in the Office Action mailed September 18, 2002. Applicant respectfully draws the Examiner's attention to, and requests entry of, the substitute drawing sheets (3) submitted with the Amendment and Response on May 28, 2002. For the Examiner's convenience, copies of the substitute drawing sheets (3) submitted on May 28, 2002 are also being submitted herewith. Notification of entry of the substitute drawing sheets in the next Official Communication is again respectfully requested.

Rejection under 35 U.S.C. §112, First Paragraph

The Examiner rejected claims 25, 27-29, 31-32, 43-44, and 47-48 under 35 U.S.C. §112, first paragraph, as containing subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. The Examiner affirmed that the specification has general support for using more than one oxidizer, but further alleged that "there is no disclosure in the originally filed claims or specification to support the *criticality* of specifically a composition comprising both a sulfur trioxide oxidizer and another oxidizer" (emphasis added). Applicant respectfully traverses the rejection.

"To satisfy the written description requirement, a patent specification must describe the claimed invention in sufficient detail that one skilled in the art can reasonably conclude that the inventor had possession of the claimed invention." M.P.E.P. §2163(I). "To comply with the written description requirement . . . , each claim limitation must be expressly, implicitly, or inherently supported in the originally filed disclosure." M.P.E.P.

§2163(II)(A)(3)(b). As discussed herein after, Applicant respectfully submits that the patent specification describes the claimed invention in sufficient detail to satisfy the written description requirement. Furthermore, Applicant is not aware of any requirement for a showing of

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criticality to satisfy the written description requirement as suggested by the Examiner.

Appropriate correction of the record is requested in the next Official Communication.

First, the specification describes an organic material removal composition including sulfur trioxide (SO_3) in a supercritical state and an oxidizer (e.g., claim 25) at, for example, page 8, lines 6-13:

In one embodiment of a composition for removal of organic material according to the present invention, the supercritical component of the composition includes *one or more oxidizer components*. . . . At least *one of the oxidizer components must be in a supercritical state*. . . . Preferably, the at least one oxidizer in the supercritical state is an oxidizer component selected from the oxidizers including *sulfur trioxide (SO_3)*. . .

(emphasis added). Thus, the specification describes a composition for removal of organic material including *one or more oxidizer components*, at least *one of which must be in a supercritical state*. Furthermore, the specification teaches that the at least one oxidizer in the supercritical state may be selected from a group that includes *sulfur trioxide (SO_3)*. Thus, Applicant respectfully submits that the specification fully satisfies the written description requirement for the claimed invention (e.g., claim 25).

Second, the specification describes an organic material removal composition including a first component selected from the group consisting of carbon dioxide (CO_2), ammonia (NH_3), H_2O , nitrous oxide (N_2O), carbon monoxide (CO), nitrogen (N_2), helium (He), neon (Ne), argon (Ar), krypton (Kr), and xenon (Xe); a second component selected from the group consisting of sulfur dioxide (SO_2), nitrous oxide (N_2O), NO , NO_2 , ozone (O_3), hydrogen peroxide (H_2O_2), F_2 , Cl_2 , Br_2 , and oxygen (O_2); and sulfur trioxide (SO_3) in a supercritical state (e.g., claim 27) at, for example, page 8, lines 19-24:

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In an alternate embodiment of a composition for removal of organic material according to the present invention, the composition includes a supercritical fluid mixture of *at least one oxidizer component and one or more additional components (i.e., components other than oxidizer components)*. At least one of the one or more additional components must be in the supercritical state if an oxidizer component is not in the supercritical state.

Thus, the specification describes a composition for removal of organic material including *one or more oxidizer components, at least one of which may be in the supercritical state* (e.g., the second component and sulfur trioxide, as discussed herein above) *AND one or more additional components, i.e., a component other than oxidizer components* (e.g., the first component). The specification at, for example, page 9, lines 1-4, also teaches that the first component may be selected from "the group of carbon dioxide (CO₂), ammonia (NH₃), H₂O, nitrous oxide (N₂O), carbon monoxide (CO), inert gases (e.g., nitrogen (N₂), helium (He), neon (Ne), argon (Ar), krypton (Kr), xenon (Xe), etc.)." Finally, the specification at, for example, page 8, lines 13-14, teaches that the second component may be selected from the group "sulfur dioxide (SO₂), nitrous oxide (N₂O), NO, NO₂, ozone (O₃), hydrogen peroxide (H₂O₂), F₂, Cl₂, Br₂, and oxygen (O₂)."
Thus, Applicant respectfully submits that the specification fully satisfies the written description requirement for the claimed invention (e.g., claim 27).

Third, the specification describes an organic removal composition including a first component (e.g., CO₂); a second component; and sulfur trioxide (SO₃) in the supercritical state; wherein the ratio of carbon dioxide:sulfur trioxide is about 10:1 by volume to about 1:1 by volume (e.g., claim 31). For example, originally filed claim 31 recites a composition (e.g. the organic removal composition of originally filed claim 27 which *comprises* a first component and a second component) wherein the "ratio of carbon dioxide:sulfur trioxide is . . . about 10:1 by volume to about 1:1 by volume." Since the organic removal composition is defined as *comprising* a first and second component, and thus by definition may include additional components, Applicant respectfully submits that the Examiner's allegation that the specification "discloses volume ratios for only a two, but not a three, component composition" is unfounded.

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Thus, Applicant respectfully submits that the specification fully satisfies the written description requirement for the claimed invention (e.g., claim 31).

Finally, the specification describes an organic removal composition including a first component (e.g., CO₂); a second component (e.g., an oxidizer component); and sulfur trioxide (SO₃) in the supercritical state; wherein the ratio of the sulfur trioxide (in the supercritical state) to the second component (e.g., an oxidizer component) is about 1:100 by volume to about 100:1 by volume (e.g., claim 29). For example, the specification explicitly states that "[g]enerally, the ratio of the oxidizer component to the additional component in the supercritical state is in the range of about 1:100 by volume to about 100:1 by volume" (page 9, lines 17-19). Applicant respectfully submits that this statement in the specification supports a ratio of an oxidizer component (e.g., the second component) to sulfur trioxide in the supercritical state (e.g., the additional component in the supercritical state) of about 1:100 by volume to about 100:1 by volume. Although the specification recites that "one or more additional components" are components other than oxidizer components for one specific embodiment (e.g., page 8, lines 19-26), Applicant respectfully submits that "additional components" are not so limited for all embodiments of the presently claimed invention. For example, the quoted recitation at page 9, lines 17-19, is not on its face limited to a specific embodiment of the present invention. Furthermore, the specification recites an extensive list of "additional components" that may be used to enhance the organic material removal process (e.g., page 9, lines 20-28), and the list includes, for example, inorganic acids, a genus that includes potential oxidizers (e.g., HNO₃, HClO₄). In view of the arguments presented herein, Applicant respectfully submits that the Examiner's allegation that "additional components" are limited to components other than oxidizers is unfounded.

In view of the remarks presented herein, Applicant respectfully requests that the Examiner reconsider and withdraw the rejections under 35 U.S.C. §112, first paragraph.

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For: **SUPERCRITICAL COMPOSITIONS FOR REMOVAL OF ORGANIC MATERIAL AND METHODS OF USING SAME****Rejection under 35 U.S.C. §103**

The Examiner rejected claims 19-25, 27-29, 31-32, and 43-48 under 35 U.S.C. §103(a) as allegedly being unpatentable over U.S. Pat. No. 5,013,366 (Jackson et al.) in view of U.S. Pat. No. 5,037,506 (Gupta et al.). Specifically, the Examiner alleged that the combination of Jackson et al. in view of Gupta et al. teaches a composition including sulfur trioxide in the supercritical state. Applicant respectfully traverses the rejection.

"To establish a *prima facie* case of obviousness . . . there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings." M.P.E.P. §706.02(j). Furthermore, "[t]he teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art and not based on applicant's disclosure." M.P.E.P. §706.02(j). Applicant respectfully submits that the Examiner has failed to establish a *prima facie* case of obviousness.

Jackson et al. teach the use of a dense phase gas to remove contaminants from a substrate. Although carbon dioxide is the preferred dense phase gas, typical gases may also include hydrocarbons, halogenated hydrocarbons, or inorganics such as nitrous oxide. The dense phase gas mixture may also include additives such as hydrogen peroxide, ozone, and halogens including fluorine gas. The dense phase gas is pressurized above the critical pressure, and then temperature is cycled above and below the critical temperature to effect removal of contaminants from the substrate.

As the Examiner pointed out, Jackson et al. do not teach the use of a supercritical fluid containing the oxidizing agent SO_3 to remove contaminants from a substrate. The Examiner then improperly combined the teaching of Gupta et al. with the teaching of Jackson et al. to support the above rejection. It is respectfully submitted that this is improper because Gupta et al. fail to teach or suggest the use of *any* supercritical fluid to remove contaminants from a substrate.

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Gupta et al. disclose a method of removing organic materials, such as implant and deep UV hardened photoresist, from a substrate by using sulfur trioxide. Gupta et al. generate SO₃ vapor from commercially available stabilized or unstabilized, liquid or solid, sulfur trioxide. The SO₃ vapor is then used to remove the organic material from the substrate. Gupta et al. do not teach or suggest the use of SO₃ in a composition containing a supercritical component to remove organic material from a substrate. Significantly, Gupta et al. do not teach the use of supercritical SO₃ to remove organic material from a substrate. While SO₃ has a critical temperature of 218.3°C and a critical pressure of 83.8 atmospheres (e.g., page 16, lines 10-12 of the present specification), Gupta et al. teach the use of a maximum temperature of only up to 150°C (column 4, line 46-47), and apparently under atmospheric pressure conditions. Gupta et al. make no mention of conducting the removal process under pressurized conditions. The conditions recited by Gupta et al. are clearly inadequate to produce a supercritical fluid.

Furthermore, neither Jackson et al. nor Gupta et al. teach or suggest that SO₃ would be compatible in the preferred mixtures described herein (e.g., claims 20-21, 23-25, 27-29, 31-32, and 43-48), particularly under supercritical conditions.

Based on the remarks presented herein, Applicant respectfully requests that the Examiner reconsider and withdraw the rejection under 35 U.S.C. §103.

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It is respectfully submitted that all the pending claims are in condition for allowance and notification to that effect is respectfully requested. The Examiner is invited to contact Applicant's Representatives, at the below-listed telephone number, if it is believed that prosecution of this application may be assisted thereby.

Respectfully submitted for

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By

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PATENT TRADEMARK OFFICE

December 18, 2002

Date

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CERTIFICATE UNDER 37 CFR §1.8:

The undersigned hereby certifies that this paper is being transmitted by facsimile in accordance with 37 CFR §1.6(d) to the Patent and Trademark Office, addressed to Assistant Commissioner for Patents, Washington, D.C. 20231, on this 18th day of December, 2002, at 7:45 am (Central Time).

By:

Jill R. Price

Name: Jill R. Price

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